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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/783,265	02/19/2004	Young Nam Kim	006343.P002	7317

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EXAMINER

ONEILL, KARIE AMBER

ART UNIT	PAPER NUMBER
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1745

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/20/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/783,265	KIM, YOUNG NAM	
	Examiner	Art Unit	
	Karie O'Neill	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11-13-2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-16 and 20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-16 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The Applicant's amendment filed on November 13, 2006, was received. Claim 8 was amended.

Claim Rejections - 35 USC § 112

2. The Claim rejections under 35 U.S.C. 112, second paragraph, with regard to Claim 8 is withdrawn, because the independent Claim 8 has been amended.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 8, 10-12, 14-16 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dasgupta et al. (US 2003/0152835 A1) in view of Gurin (US 2003/0151030 A1).

With regard to Claim 8, Dasgupta et al. disclose a process for preparing a carbon nanotube or carbon nanofiber electrode, comprising the steps of: (1) preparing an electrode material by mixing carbon nanofibers with a binder (paragraph 0023); (2) preparing a pressed electrode material by first pressing the graphite, carbon nanofibers and binder (paragraph 0012); and (3) subsequently heat-treating the previously pressed

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electrode material (paragraph 0016) that is placed on a conductive substrate (paragraph 0012).

Dasgupta et al. do not disclose wherein the carbon nanotubes or nanofibers are mixed with a binder comprising sulfur or metal nanoparticles or the sulfur or metal nanoparticles are deposited on the carbon nanotubes or nanofibers.

Gurin discloses carbon particles, including carbon nanotubes of both the single-walled and multi-walled type (paragraph 0056), with a metal coating in nanoscale proportions deposited on the surface of said carbon particles. Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to use a carbon nanotube or carbon nanofiber mixed with metal nanoparticles for preparing the electrode of Dasgupta et al., because Gurin teaches the conductivity of the carbon nanotubes being enhanced with a metal nanoparticle coating and to take advantage of the metals non-directionality in direct contact with the carbons axial direction (paragraph 0063).

With regard to Claims 10 and 11, Dasgupta et al. do not disclose wherein in step (2) and step (3), the sulfur or metal nanoparticles are pressed under a pressure from 1 to 500 atm. However, it is the position of the examiner that the mixing or depositing of the carbon nanotubes and sulfur or metal nanoparticles would at least occur under atmospheric pressure, which is 1 atm. A reference that is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. Inherency is not established by probabilities or possibilities. *In re Robertson*, 49 USPQ2d 1949 (1999).

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With regard to Claim 12, Gurin discloses, wherein in step (1), the mixing of the carbon nanotubes with the metal nanoparticles is performed by a method of solvent mixing (paragraphs 0127 and 0134-0136). Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to solvent mix the carbon nanotubes and metal nanoparticles of Dasgupta et al., because Gurin teaches imparting metal nanoparticles onto the surface of the carbon nanotubes to improve dispersion and reduce interfacial tension as a means to improve conductivity (paragraph 0065).

With regard to Claim 14, Dasgupta et al. disclose the process wherein the pressing in step (2) provides the electrode material in the shape of a disk or film. Dasgupta et al. call this a pressed compact (paragraph 0023).

With regard to Claim 15, Dasgupta et al. disclose the process wherein in step (3), the pressing and heating are carried out consecutively by first forming the pressed compact (paragraph 0012) and then heat treating the electrode after preparation (paragraph 0016).

With regard to Claim 16, Dasgupta et al. disclose the process wherein in step (3) the heat treatment is carried out by through thermal heating in a temperature range from 45°C to 80°C (paragraph 0016).

With regard to Claim 20, Dasgupta et al. disclose the carbon nanotube or carbon nanofiber electrode prepared for use in a lithium secondary battery (paragraph 0023).

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5. Claims 8 and 10-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dasgupta et al. (US 2003/0152835 A1) in view of Choi et al. (US 2004/0018416 A1).

With regard to Claim 8, Dasgupta et al. disclose a process for preparing a carbon nanotube or carbon nanofiber electrode, comprising the steps of: (1) preparing an electrode material by mixing carbon nanofibers with a binder (paragraph 0023); (2) preparing a pressed electrode material by first pressing the graphite, carbon nanofibers and binder (paragraph 0012); and (3) subsequently heat-treating the previously pressed electrode material (paragraph 0016) that is placed on a conductive substrate (paragraph 0012).

Dasgupta et al. do not disclose wherein the carbon nanotubes or nanofibers are mixed with a binder comprising sulfur or metal nanoparticles or the sulfur or metal nanoparticles are deposited on the carbon nanotubes or nanofibers.

Choi et al. disclose the internal and external walls of carbon nanotubes are uniformly doped with metallic catalyst particles, having a diameter of a few nanometers (paragraph 0029). Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to mix carbon nanotubes with metal nanoparticles to form the electrode of Dasgupta et al., because Choi et al. teach the reaction efficiency in an electrode becomes maximal (paragraph 0029).

With regard to Claims 10 and 11, Dasgupta et al. do not disclose wherein in step (2) and step (3), the sulfur or metal nanoparticles are pressed under a pressure from 1 to 500 atm. However, it is the position of the examiner that the mixing or depositing of

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the carbon nanotubes and sulfur or metal nanoparticles would at least occur under atmospheric pressure, which is 1 atm. A reference that is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. Inherency is not established by probabilities or possibilities. *In re Robertson*, 49 USPQ2d 1949 (1999).

With regard to Claims 12 and 13, Choi et al. disclose wherein the step (1), the mixing of carbon nanotubes with metal nanoparticles is preformed by a method chosen from the group consisting of uniformly dispersing the metal nanoparticles on the surfaces of the carbon nanotubes (paragraph 0031) and wherein the method of uniformly dispersing the metal nanoparticles on the surfaces of the carbon nanotubes is carried out by a method selected from the group consisting of electrophoresis, thermal spraying, sputtering, chemical vapor deposition and any other techniques common to one of ordinary skill in the art (paragraph 0033). Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to uniformly disperse the metal nanoparticles on to the carbon nanotubes of Dasgupta et al., because Choi et al. teach evenly distributing metal nanoparticles on to the carbon nanotubes so that they are fixed stably thereto so as not to be affected by an external force (paragraph 0029).

With regard to Claim 14, Dasgupta et al. disclose the process wherein the pressing in step (2) provides the electrode material in the shape of a disk or film. Dasgupta et al. call this a pressed compact (paragraph 0023).

With regard to Claim 15, Dasgupta et al. disclose the process wherein in step (3), the pressing and heating are carried out consecutively by first forming the pressed

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compact (paragraph 0012) and then heat treating the electrode after preparation (paragraph 0016).

With regard to Claim 16, Dasgupta et al. disclose the process wherein in step (3) the heat treatment is carried out by through thermal heating in a temperature range from 45°C to 80°C (paragraph 0016).

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dasgupta et al. (US 2003/0152835 A1) in view of Gurin (US 2003/0151030 A1), as applied to Claims 8, 14-16 and 20 above.

With regard to Claim 9, Dasgupta et al. disclose the process for preparing a carbon nanotube or carbon nanofiber electrode in paragraph 4 above, but do not disclose wherein in step (2) the electrode material is uniformly dispersed on the current collector and then pressed, or simultaneously dispersed and the pressed. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to disperse the electrode material onto the current collector and then press it again since it is known in the art that pressing materials together forms a tighter and more secure bond.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

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§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karie O'Neill whose telephone number is (571) 272-8614. The examiner can normally be reached on Monday through Friday from 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Karie O'Neill
Examiner
Art Unit 1745

KAO


DAI-WEIYUAN
PRIMARY EXAMINER